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AGRICULTURAL MEMORANDUM NO 574

Sequences of work days for grass conservation - South West England

D FORSDYKE

Following interest expressed in Agric Memo No 531 which dealt with sequences of work days in Wales a similar analysis has been undertaken for South West England, a region where grass is of major importance.

DEFINITIONS

A "dry" day is taken to be one with a rainfall amount not greater than 0.01 in. A work day is defined as a dry day followed by various numbers of dry days for different methods of conservation.

The methods of conservation and their work day requirements are:

i) Direct cut silage - one work day

ii) Wilted silage - one work day followed by one dry day

iii) Barn hay - one work day followed by 2 dry days

iv) Quick hay - one work day followed by 3 dry days

v) Slow hay - one work day followed by 4 dry days

Since the object of the investigation was to compare the days available for the different methods, the analysis covered the whole season, stated to be mid-May to the end of September although at any particular time through the season any one method might be inappropriate for other reasons. The season was divided up into 14 consecutive 10 day periods from May 15 through October 1.

It is important to realise that the definition of a work day above gives no conflict in deciding the appropriate allocation to a particular 10 day period when a dry spell extends from one period to the next. Thus consider the following run of days where D represents a dry day and W a wet one:

..... W / D D W W W D D W D D / D D D W W D .....

The count of work days in the 5 classes for the above complete 10 day period is then:

i) 6 - number of 1 + 0 work days

ii) 4 - " " 1 + 1 " "

iii) 2 - " " 1 + 2 " "

iv) 2 - " " 1 + 3 " "

v) 1 - " " 1 + 4 " "

Providing one considers that the decision is made and the work is started on the

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work day then a proper allocation to the successive 10 day periods can be made, and there is no difficulty in dealing with dry spells which overlap contiguous periods.

DATA

The basic data used in this analysis were computer print-outs of daily (24 hour) rainfall totals during the summer season (May 15-Oct 1) for a selection of stations in South West England for the 10 year period 1961-1970 inclusive.

RESULTS

In looking at the data for Wales it had been realised that there was a correlation between the average number of dry days ("1 + 0" work day) and the other 4 categories of work days and in this investigation the relationship was tested. As a first step the data from 12 arbitrarily selected stations were completely analysed and plots of the overall averages of work days made against the average number of dry days. Best fit curves were drawn by eye (Figure 1) and these were used to estimate the average numbers of work days for a further 14 stations from the average number of dry days at each station. These estimated values were then compared with the actual averages obtained from a full analysis of the additional stations. The results of this comparison are tabulated in Table 1 and show that the differences are acceptably small. The data from the 26 stations analysed at this stage were combined to produce Figure 2 which was then used to estimate values at a further 29 stations. Figure 3 shows the distribution of stations used in the analysis. The actual values from the 26 stations fully analysed plus the estimated values for the remaining 29 stations were then used to prepare Figures 4-8 which show the geographical distribution of the average numbers of work days per 10 day period for the South West Region. The patterns are clearly similar and show some correspondence with the major topographical features.

As well as the geographical variation, the seasonal variation was investigated using the 26 fully analysed stations. Figure 9 shows the average frequency of work days for each 10 day period as a fraction of the overall average shown in Figures 4-8. The pattern of seasonal variation is practically identical to that previously found for Wales.

In addition to the average frequencies of occurrence of work days, it is important to have estimates of the numbers of years in 10 in which there is one, or more, work day per 10 day period. Once again, the fully analysed 26 stations were used and Figures 10-14 show the geographical variation of this parameter. Figure 15 gives the seasonal variation, again as a fraction of the overall average.

DISCUSSION

The results of this investigation are similar to those obtained for Wales and in particular, the pattern of seasonal variation is identical, although the actual values differ. There is a similar contrast between the average number of days available for silage and haymaking, roughly 2 to 1, and taking the criterion that at least one work day in 10 days is needed 7 or 8 years out of 10 then only conservation methods (i), (ii) and (iii) are really viable over much of the area. To investigate whether these results are peculiar to the decade studied further data for a limited number of stations will be analysed for the preceding decade.

Any comments or suggestions on this paper should be sent to the author.

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TABLE 1

Comparison of estimated (E) and actual (A) averages of work days per 10 day period for 14 stations

Station	No of "1 + 0" work days	WORK DAYS							
		1 + 1		1 + 2		1 + 3		1 + 4	
		E	A	E	A	E	A	E	A
Porthcurno	5.8	4.2	4.2	3.2	3.2	2.5	2.5	2.0	2.0
Culdrose	5.7	4.1	4.1	3.1	3.2	2.4	2.5	1.9	2.0
St Austell	5.1	3.6	3.6	2.7	2.7	2.0	2.1	1.5	1.6
Slapton	6.0	4.3	4.3	3.3	3.3	2.6	2.7	2.1	2.1
Yellan	5.6	4.0	4.1	3.1	3.2	2.4	2.5	1.9	2.0
Hawkridge	4.5	3.2	3.2	2.4	2.4	1.7	1.9	1.2	1.5
Okehampton	4.8	3.4	3.4	2.5	2.5	1.8	1.9	1.4	1.5
Clovelly Court	5.1	3.6	3.5	2.7	2.7	2.0	2.1	1.6	1.6
Bude	5.4	3.8	3.9	2.9	2.9	2.2	2.2	1.7	1.8
Torridge Vale	5.2	3.7	3.7	2.8	2.8	2.1	2.2	1.6	1.7
Tavistock	5.0	3.5	3.7	2.6	2.8	2.0	2.2	1.5	1.7
Slade	5.0	3.5	3.6	2.6	2.7	2.0	2.1	1.5	1.7
Kilmington	6.1	4.4	4.4	3.4	3.4	2.7	2.7	2.2	2.1
Sutton Bingham	6.5	4.8	4.9	3.8	3.9	3.0	3.2	2.5	2.7
RMS difference between actual & estimated values		.09		.08		.13		.15	

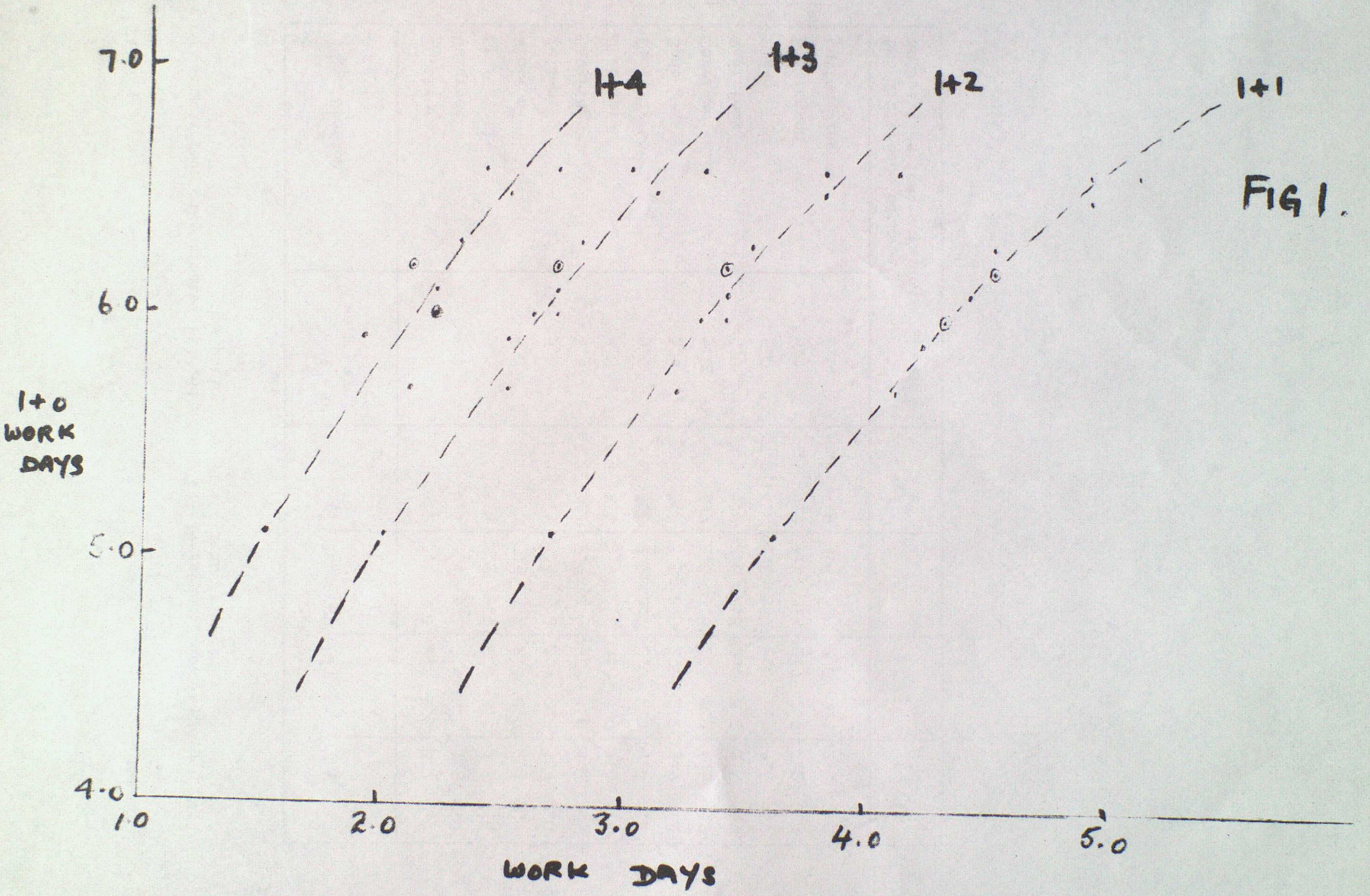


FIG 1.

FIG 2

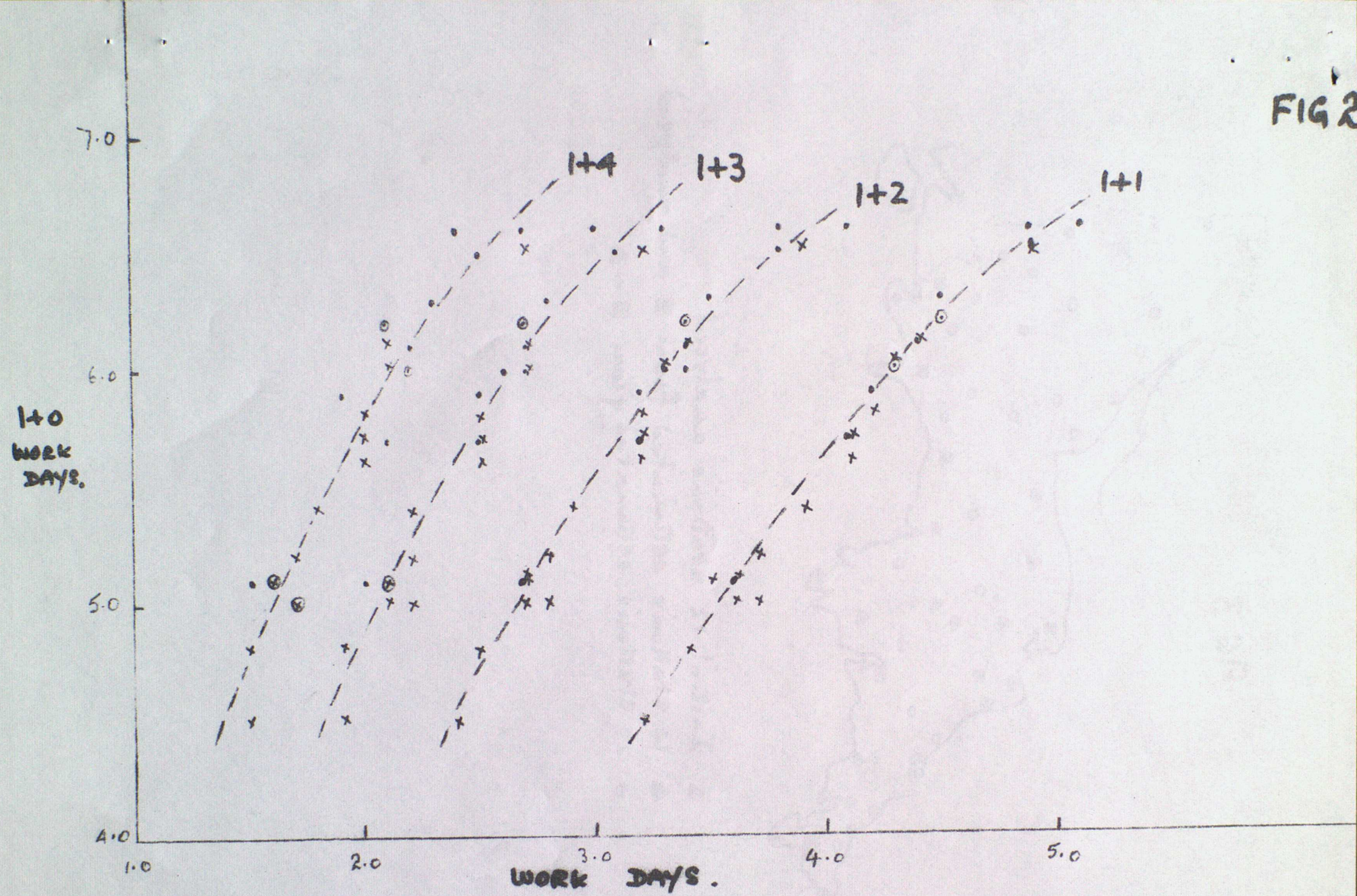
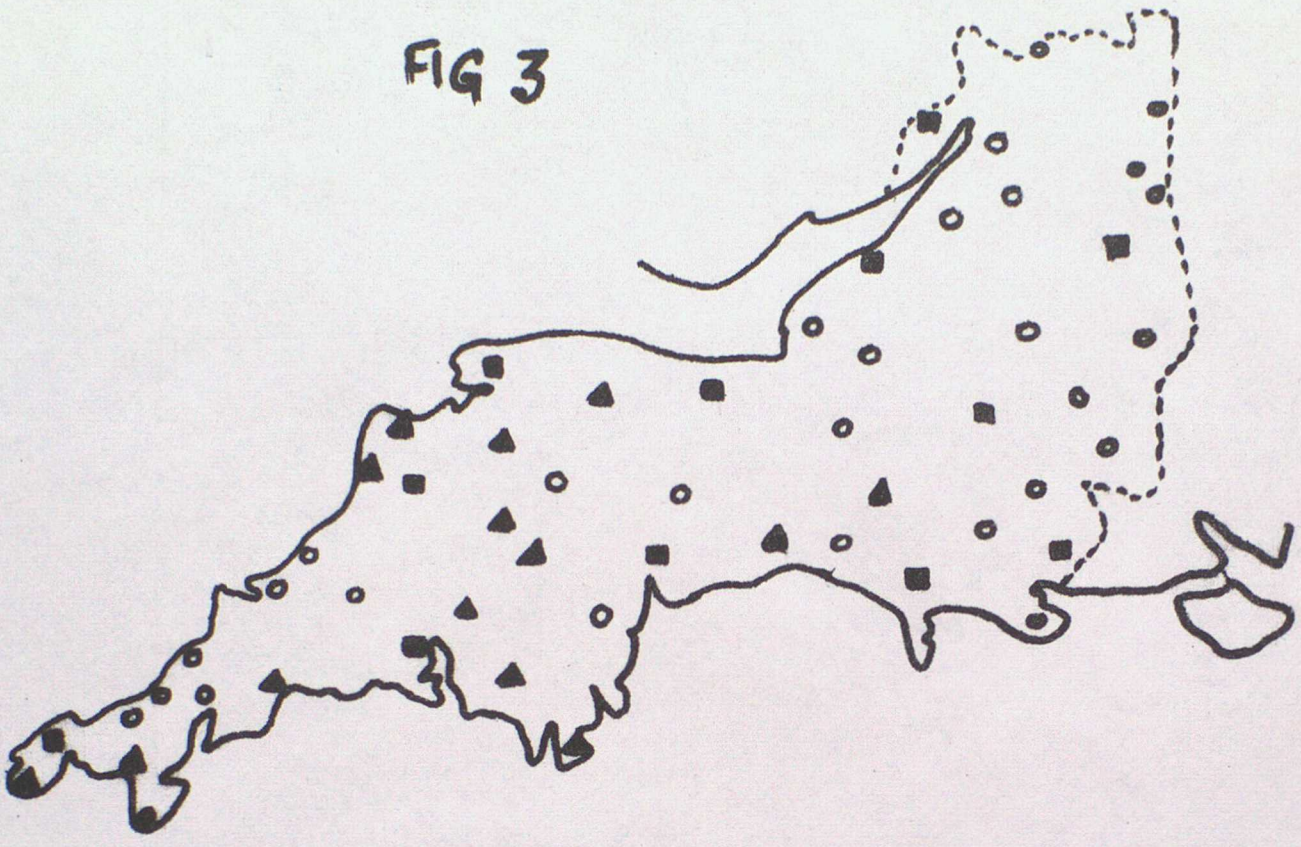


FIG 3



■ Initial 12 stations analysed.
▲ 14 stations estimated from ■ and analysed
○ 29 stations estimated from ■ + ▲

FIG 4

Average number of '140' work days per 10 day period MAY 15 - OCT 1.

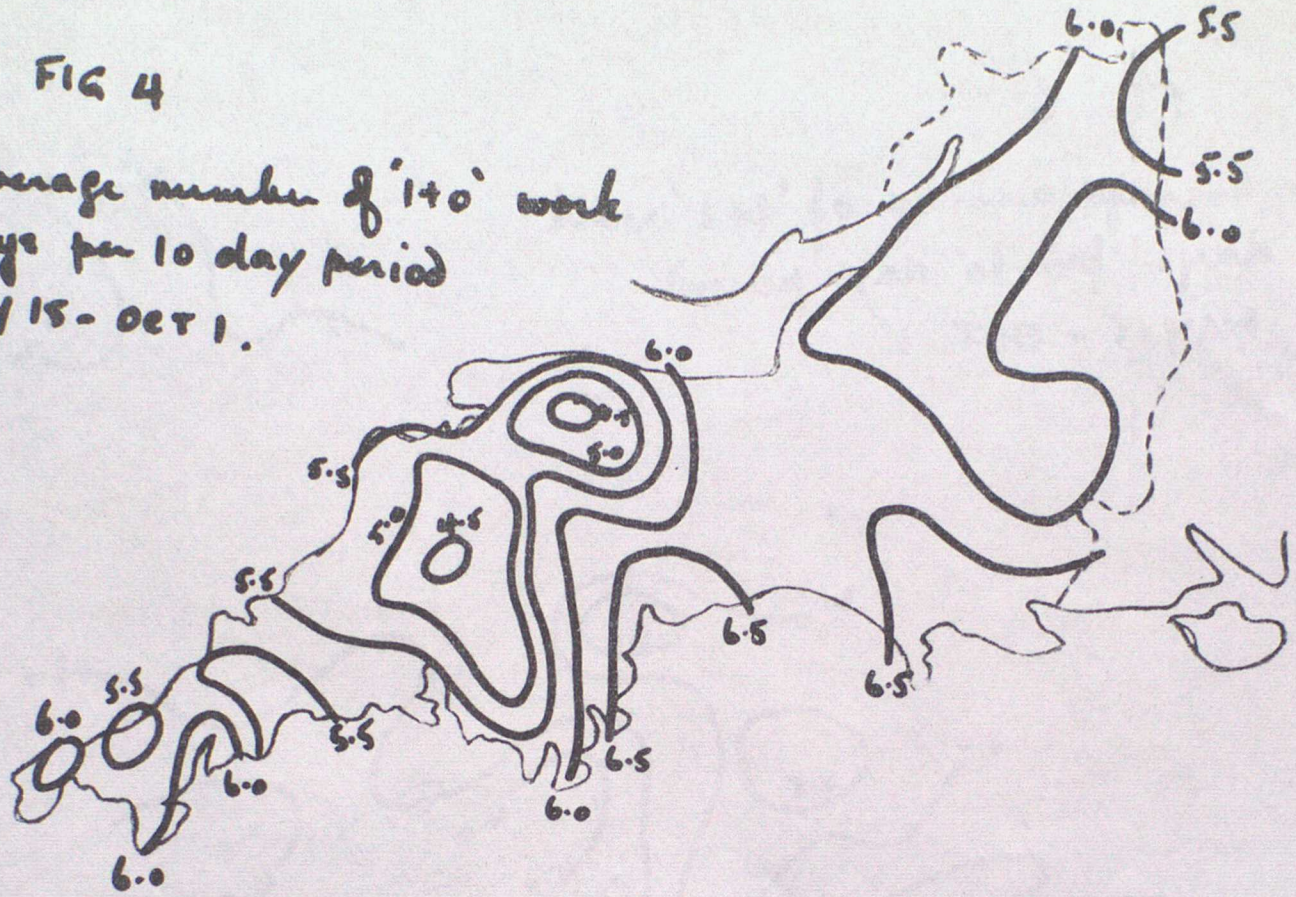


FIG 5

Average number of '141' work days per 10 day period MAY 15 - OCT 1

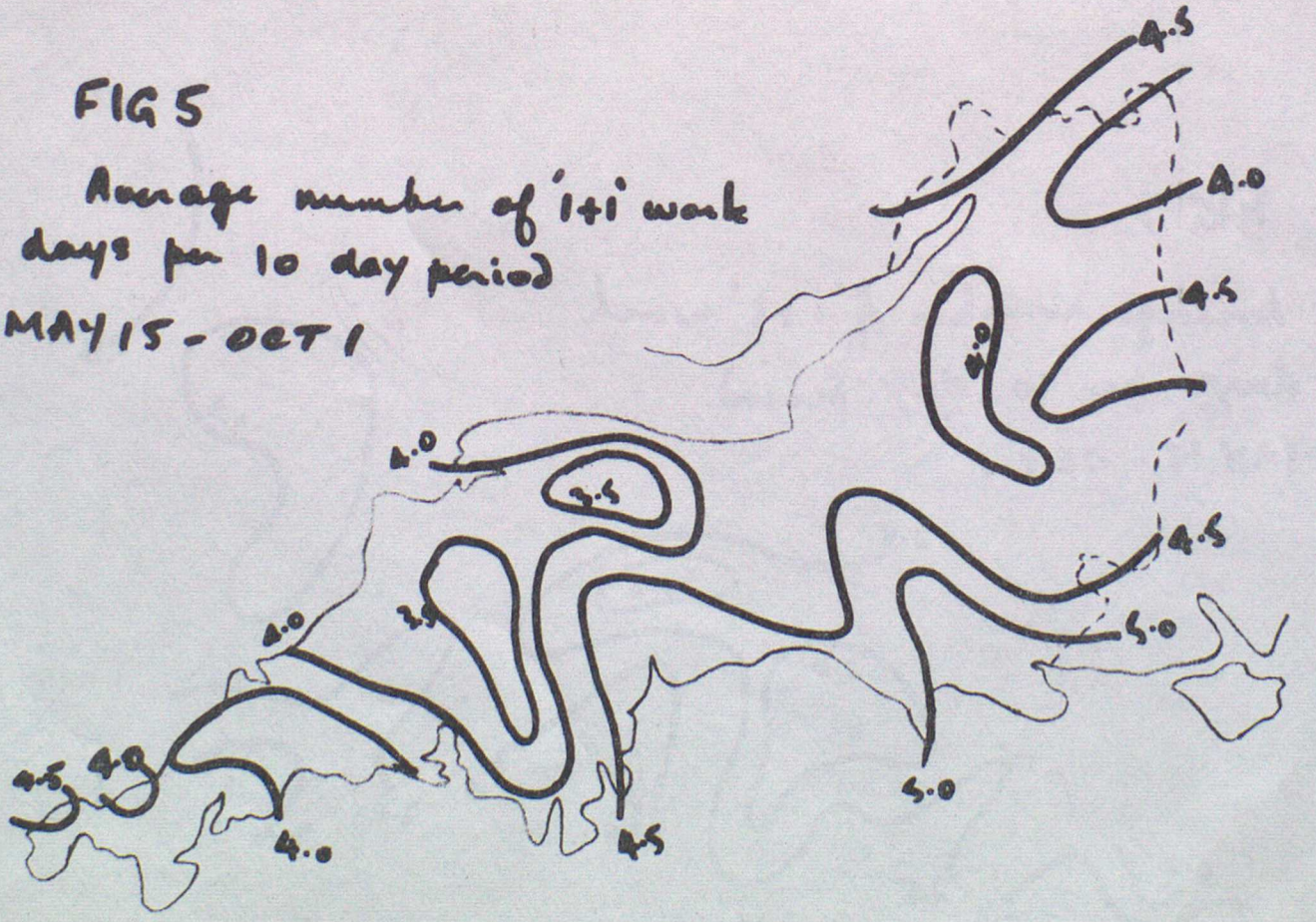


FIG 6

Average number of '1+2' work days per 10 day period MAY 15 - OCT 1

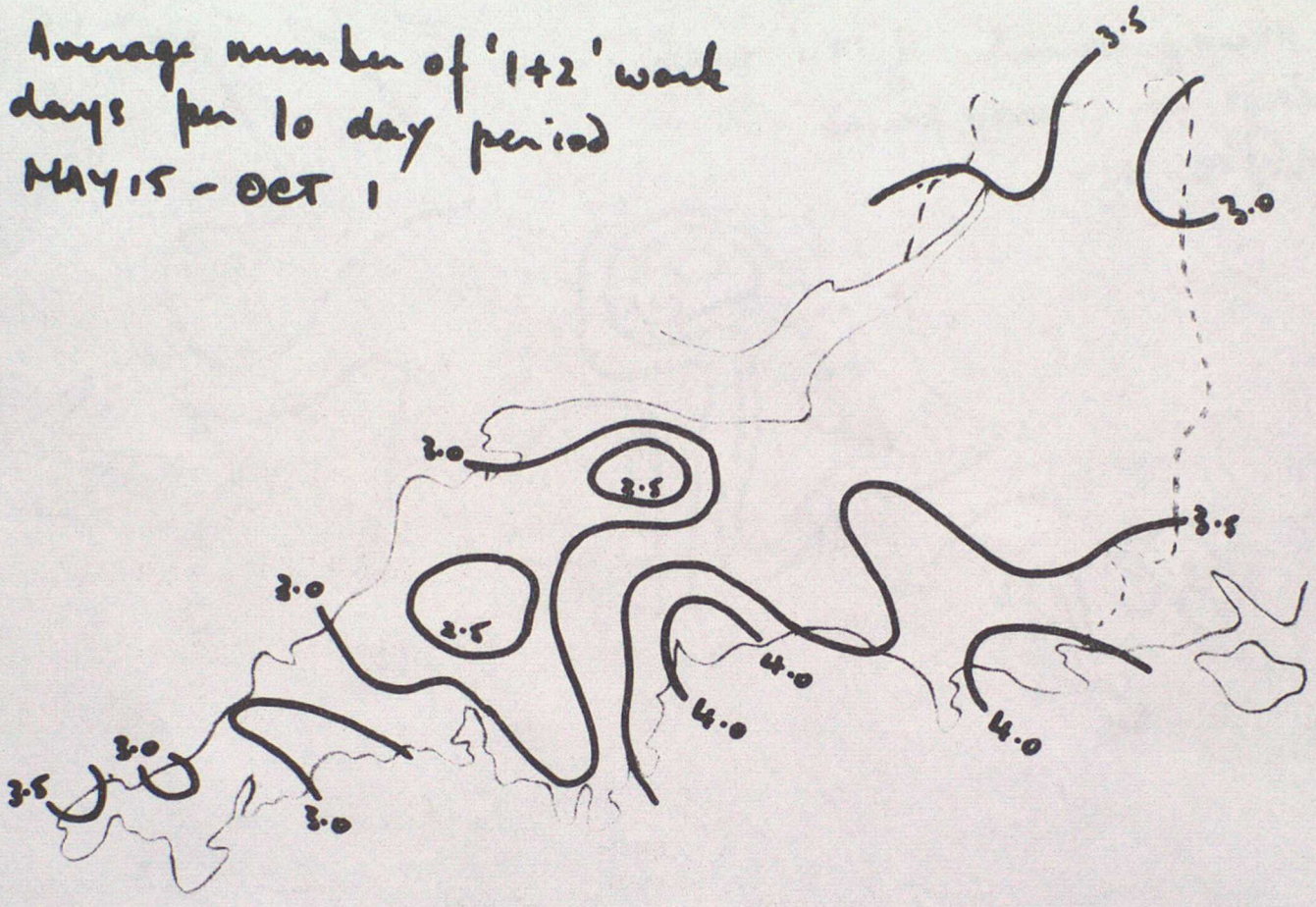


FIG 7

Average number of '1+2' work days per 10 day period MAY 15 - OCT 1

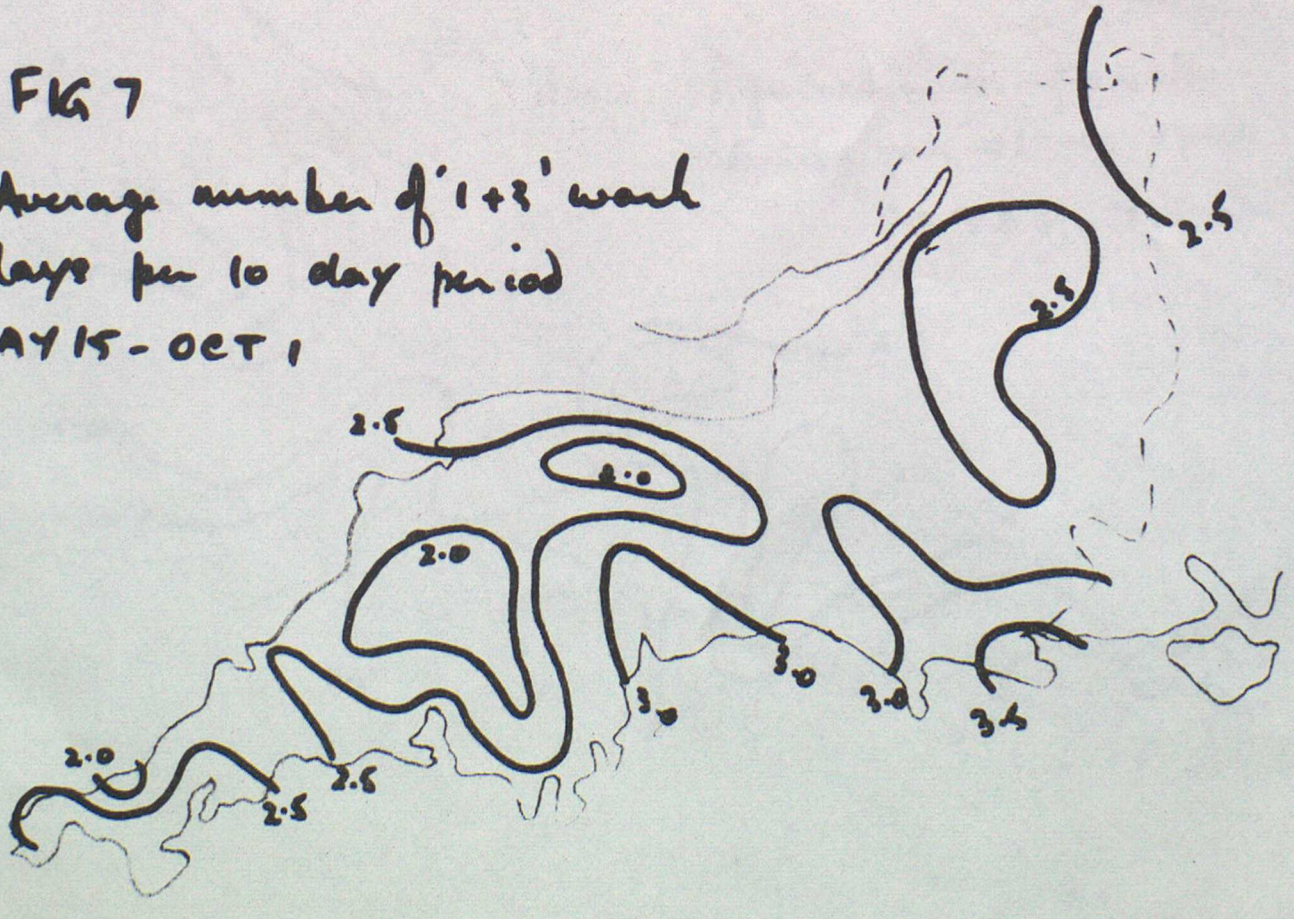


FIG 8

Average number of '1+4' work days per 10 day period

MAY 15 - OCT 1

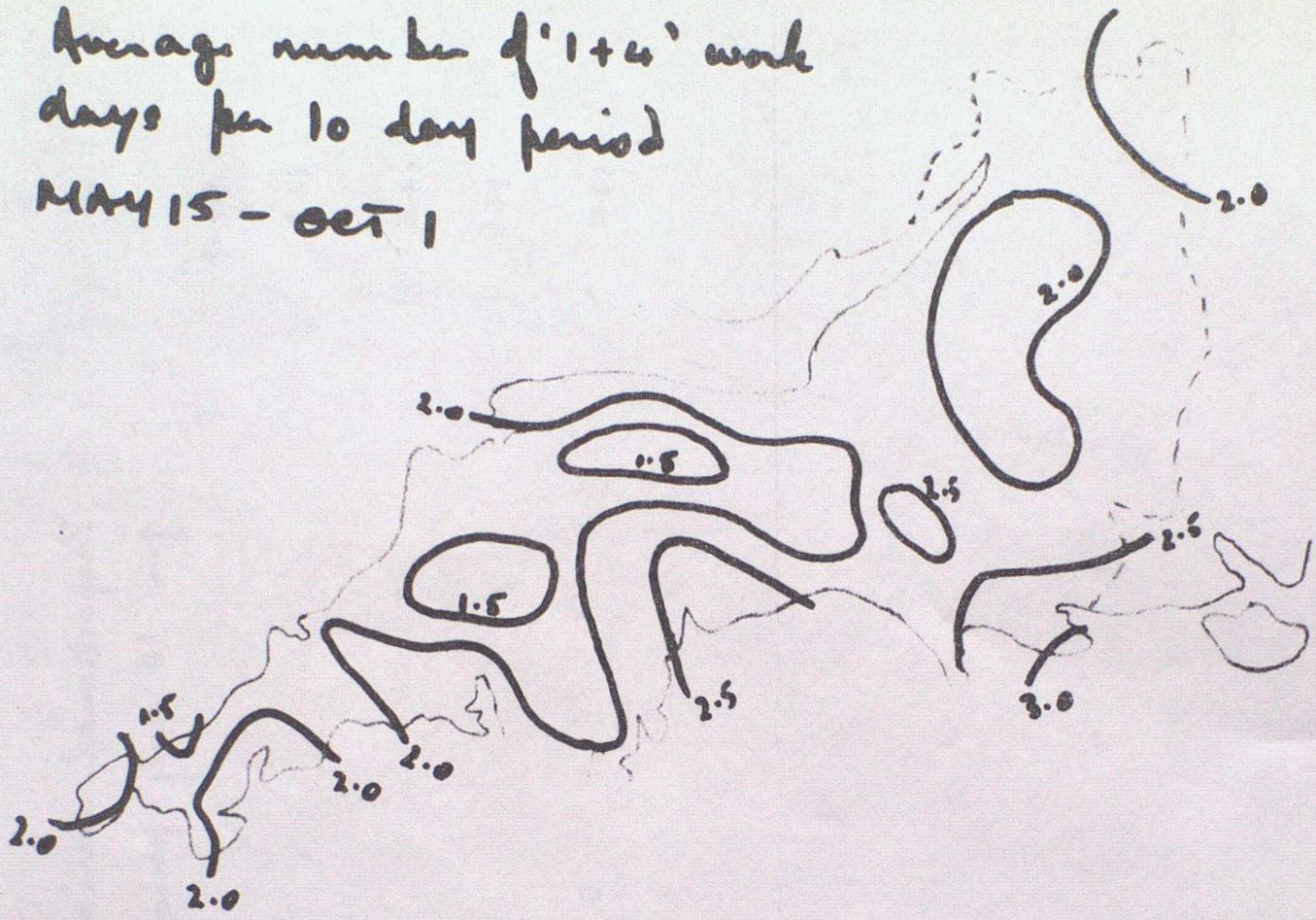


FIG 9

Proportional variation of number of work days per 10 day period MAY 15 - OCT 1.

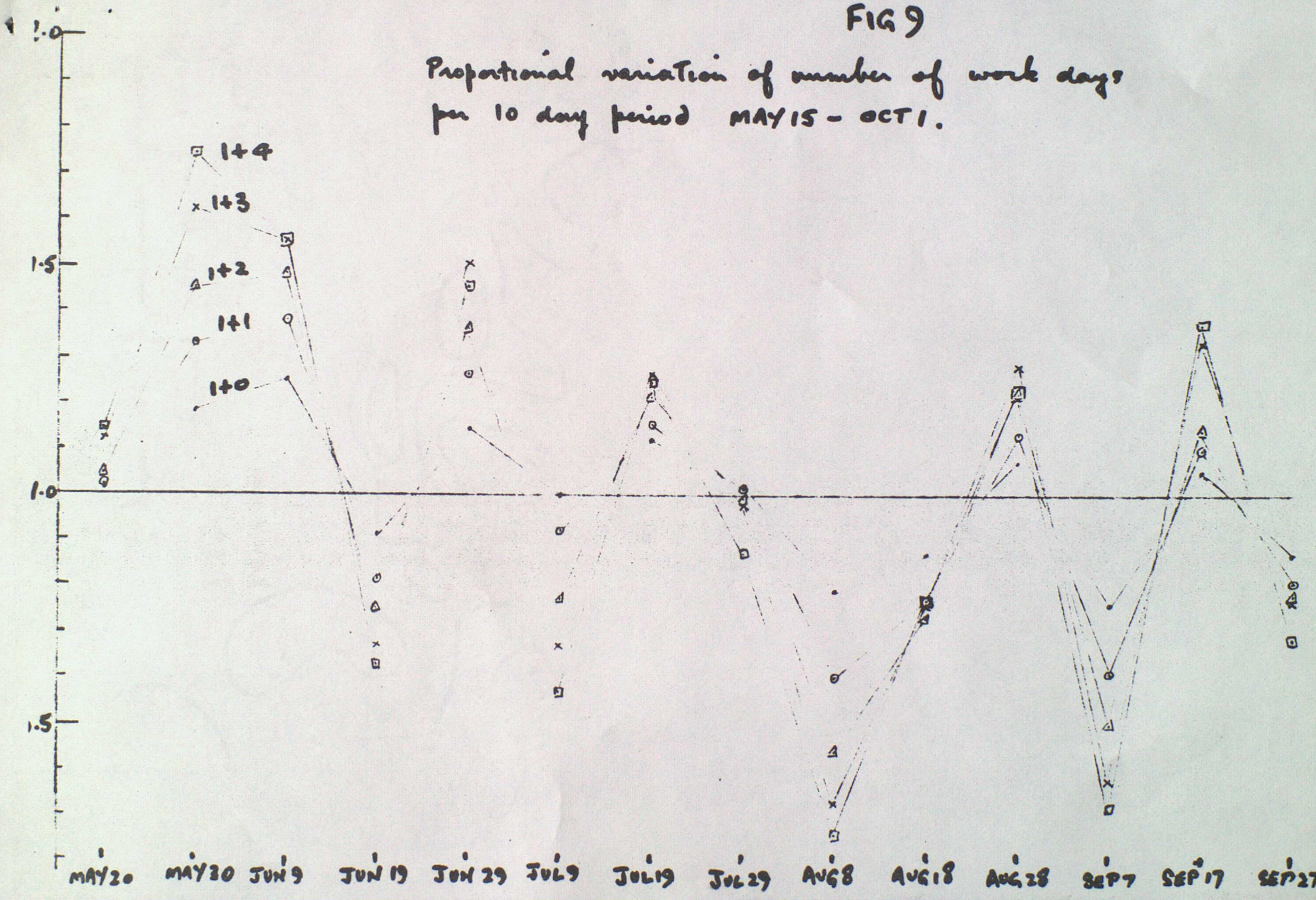


FIG 10

Average number of years when I can use '140' work day per 10 day period.

MAY 15 - OCT 1

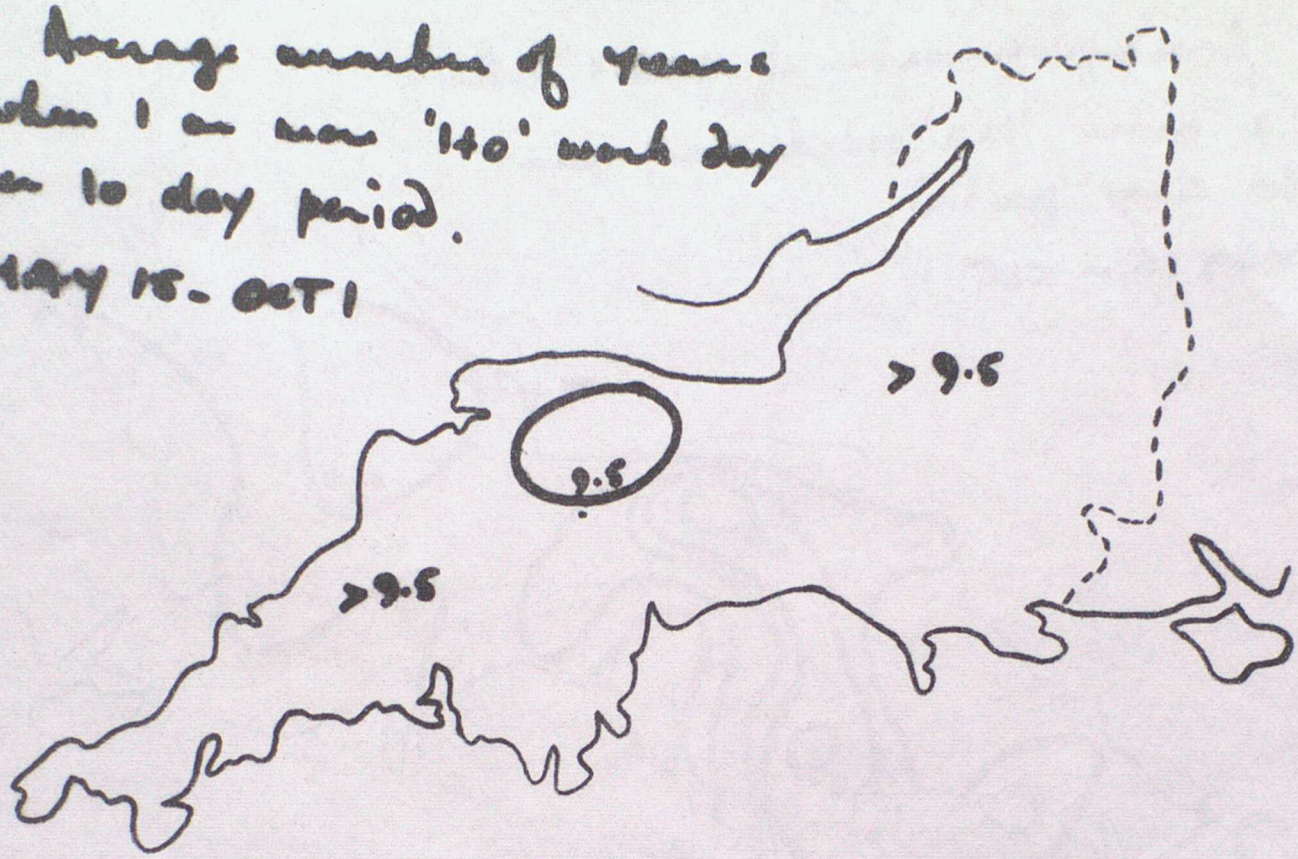


FIG 11

Average number of years when I can use '141' work day per 10 day period.

MAY 15 - OCT 1

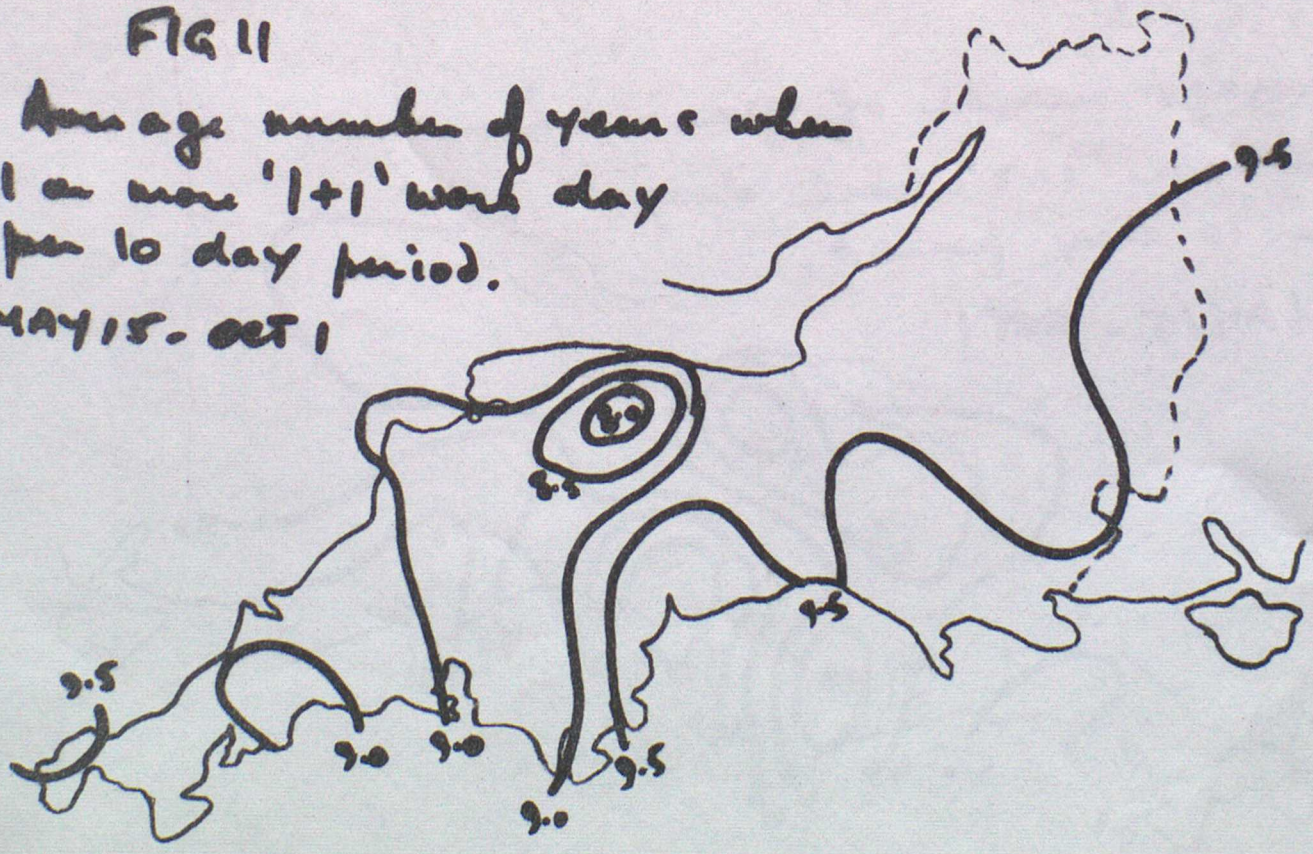


FIG 12.

Average number of years when 1 or more '1+2' work days fall in 10 day period.

MAY 15 - OCT 1

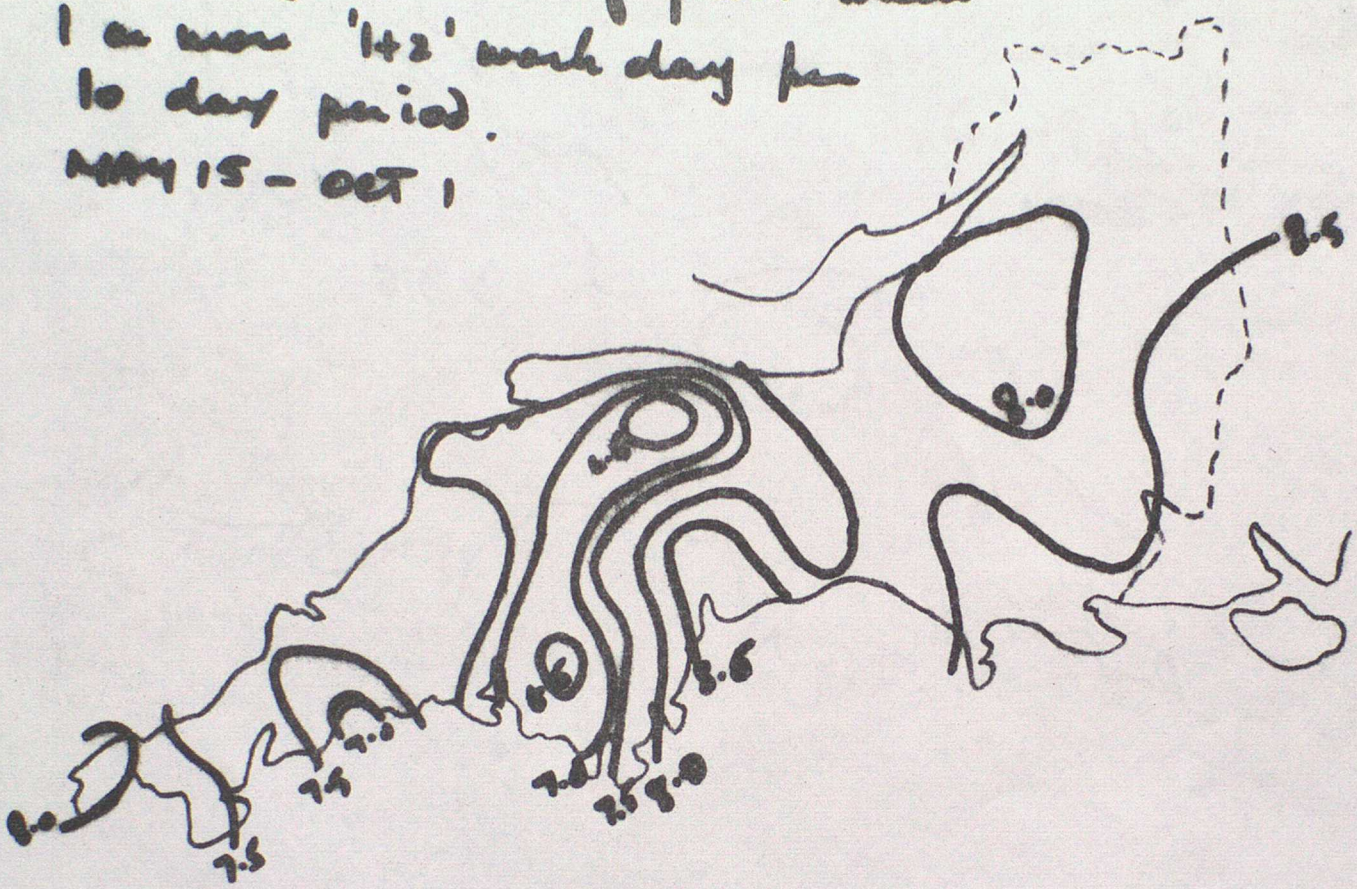


FIG 13

Average number of years when 1 or more '1+2' work days fall in 10 day period.

MAY 15 - OCT 1

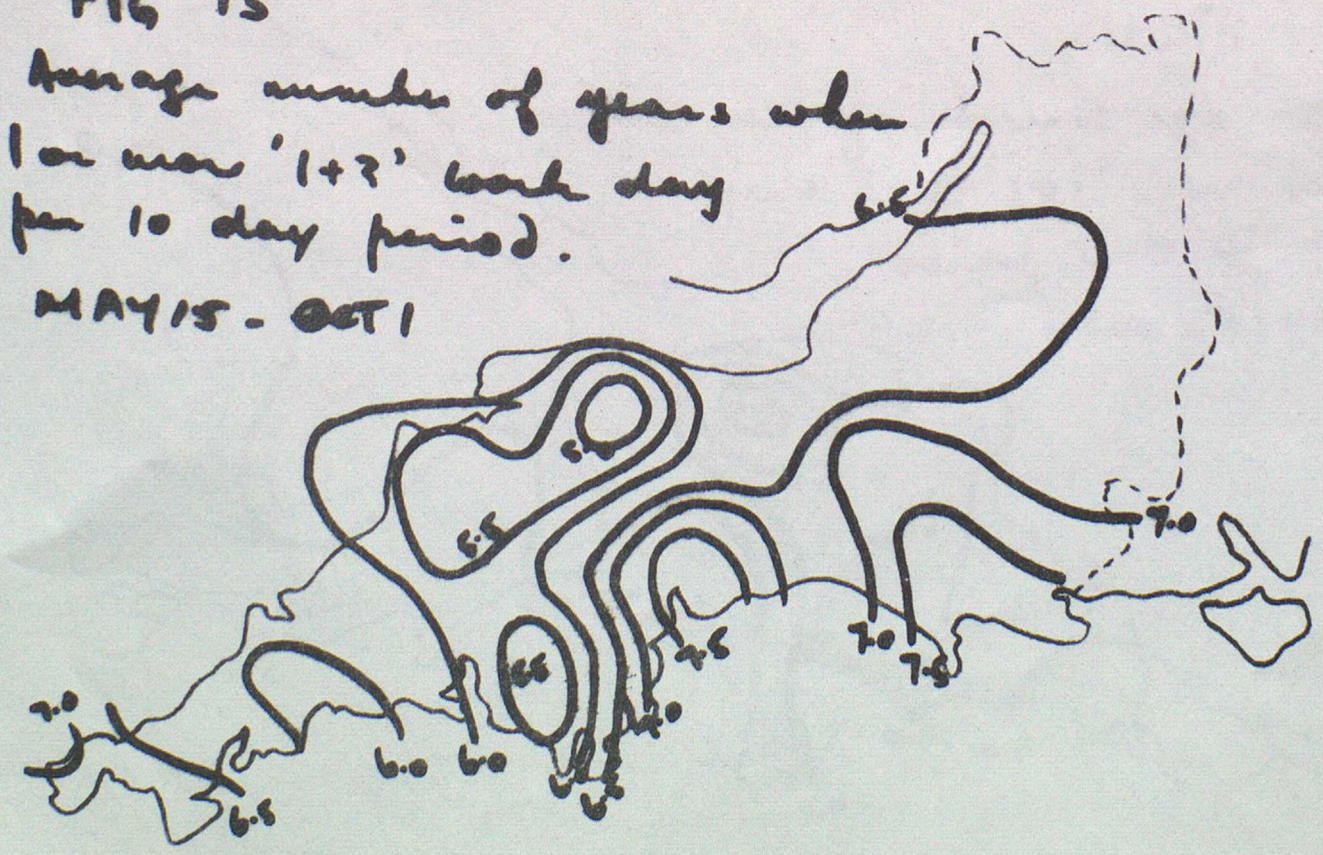


FIG 14

Average number of years when
1 or more '1+4' work days for
10 day period.
MAY 15 - OCT 1.

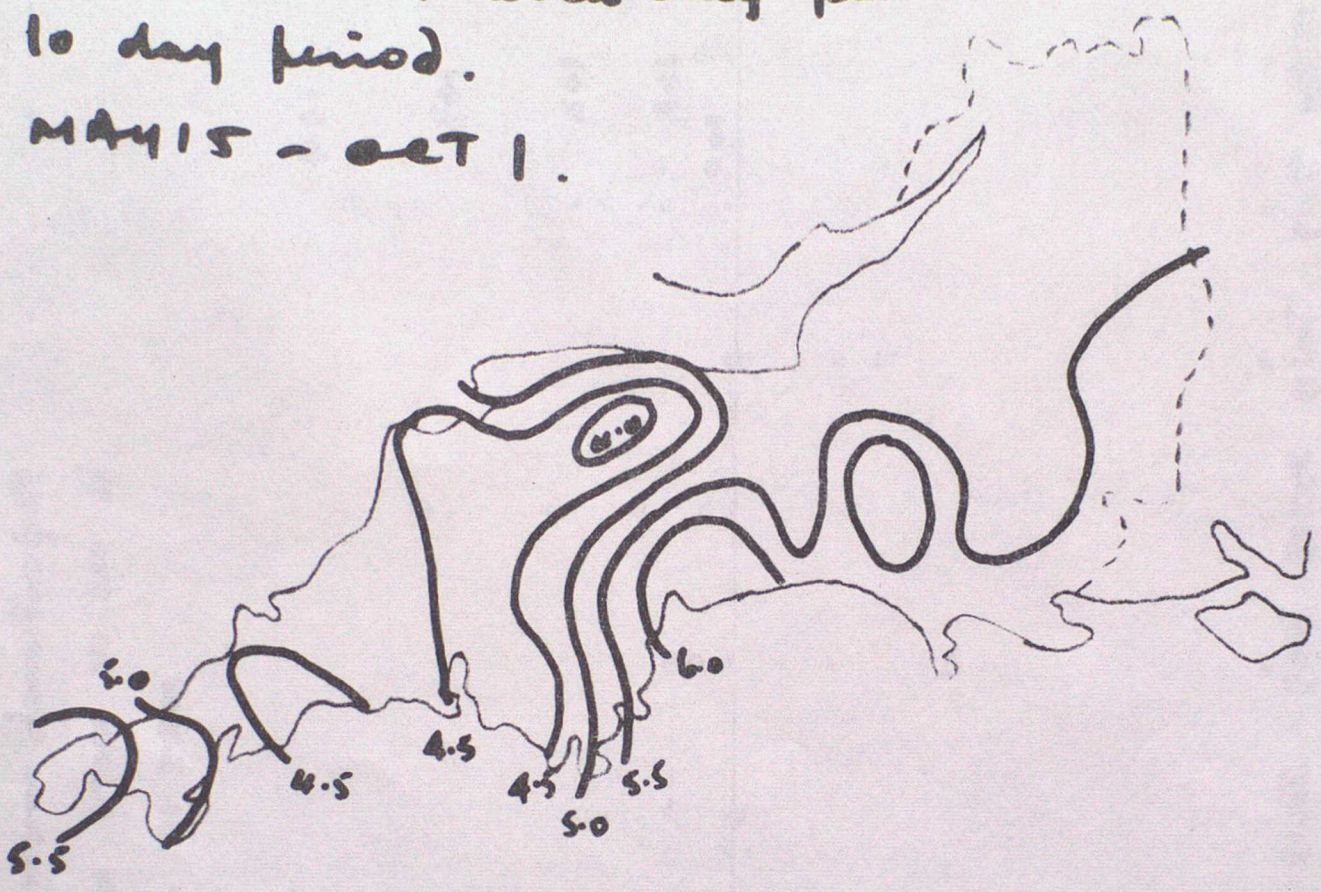


FIG 15.

Proportional number of years in 10 for which there is one or more work day per 10 day period.
MAY 15 - OCT 1.